SPECIFICATION

1. Title of the Device HEAT EXCHANGER FOR AUTOMOBILE

2. Claim

(1) A heat exchanger for automobile, comprising one pair of tubular headers which are disposed while being spaced and to each of whose outer periphery faces there is fixedly provided an attaching bracket, plural heat-transfer pipes communicating both headers mutually, plural fins provided between the mutually adjoining heat-transfer pipes, a fluid inlet for feeding a fluid to the heat-transfer pipes through the header, a fluid outlet for taking out the fluid from the heat-transfer pipes through the header, and one pair of side plates which restrain both end parts of a core comprising the plural heat-transfer pipes and the plural fins, and both end parts of each of which are respectively fixed by brazing to the one pair of headers, characterized in that, at both end parts of each of the one pair of headers, there are possessed slit-like through holes which are respectively formed in mutually opposing side faces, and taper parts which are formed in both end parts of each of the one pair of side plates and each of whose width becomes narrow as going toward its end part, and that each of the headers and each of the side plates are jointed by brazing under a state that each of the taper parts has been inserted into each of the trough holes without a backlash.

(Embodiments)

Next, the present device is more detailedly explained while explaining embodiments shown in the drawings.

Figs.1 - 2 show a 1st embodiment of the present device, and Fig.1 is a plan view of a side plate and Fig.2 a front view of the same.

As shown in Fig.4, similarly to a condenser 1 which is one kind of a conventional heat exchanger for automobile mentioned before, a heat exchanger itself for automobile of the present device is constituted by one pair of tubular headers 2a, 2b which are disposed while being spaced, to whose outer periphery faces there are fixed attaching brackets 5, 5 and each of whose section is circular and the like, plural heat-transfer pipes 3, 3 communicating both headers 2a, 2b mutually, plural fins 4, 4 provided between the mutually adjoining heat-transfer pipes 3, 3, a fluid inlet for feeding a fluid such as refrigerant into the heat-transfer pipes 3, 3 through either header 2a (or 2b), a fluid outlet for taking out the fluid such as refrigerant from the heat-transfer pipes 3, 3 through either header 2b (or 2a), and one pair of side plates 7, 7 which restrain both end parts of a core part 6 comprising the plural heat-transfer pipes 3, 3 and the plural fins 4, 4, and whose both end parts are respectively fixed by brazing to the one pair of headers 2a, 2b.

Additionally, as shown in Figs.1 - 2, in the heat exchanger for automobile of the present device, slit-like through holes

9, 9 are respectively formed at both end parts of the one pair of headers 2a, 2b and in mutually opposing side faces.

Together with these, in both end parts of each of the side plates 7, 7, there are formed taper parts 10, 10 each of whose width becomes narrow as going toward its end part. A width dimension w of a tip part of each of the taper parts 10, 10 is smaller than a length dimension L of each of the through holes 9, 9, and a width dimension W of its base end part is made the same as the length dimension L or slightly larger than this ($w < L \leqq W$). As a result, although each of the taper parts 10, 10 can be easily inserted into each of the through holes 9, 9, in a case where each of the taper parts 10, 10 is inserted into each of the through holes 9, 9 up to the base end part of the taper part, the fact becomes null that each of the taper parts 10, 10 backlashes inside each of the through holes 9, 9 becomes null.

Additionally, in the 1st embodiment shown in Figs.1 - 2, each of tongue-like parts 11, 11 is formed in the tip part of each of the taper parts 10, 10 and, in an end part side face of each of the headers 2a, 2b and at a side opposite to each of the through holes 9, 9, there is formed each of small through holes 12, 12 having a size capable of inserting each of the tongue-like parts 11, 11.

In a case where the heat exchanger for automobile of the present device is assembled, each of the taper parts 10, 10

constituted like the above is inserted into each of the through holes 9, 9 constituted like the above without the backlash, and each of the tongue-like parts 11, 11 is inserted through each of the small through holes 12, 12. And, in a tip part of each of the tongue-like parts 11, 11, a portion protruding from an end part outer periphery face of each of the header 2a, 2b is bent toward the outer periphery face of each of the headers 2a, 2b.

Under a state that the tip part of each of the tongue-like parts 11, 11 has been bent like this, the fact becomes null that each of the side plates 7, 7 and each of the header 2a, 2b are relatively displaced.

That is, the fact that each of the header 2a, 2b is displaced in a torsion rotation direction is prevented by an engagement between each of side edges 10a, 10a of each of the taper parts 10, 10 and an end edge of each of the trough holes 9, 9, and the fact that each of the taper parts 10, 10 is extracted from an inside of each of the through holes 9, 9 is prevented by an engagement between each of the tongue-like parts 11, 11 and an end edge part of each of the small trough holes 12, 12.

Whereupon, under the state that the tip part of each of the tongue-like parts 11, 11 is bent intact like this, if each of the headers 2a, 2b and each of the side plates 7, 7 are jointed by brazing, the fact becomes null that a position of each of the attaching brackets 5, 5 (Figs.4 - 5) previously fixed to

an outer periphery face of each of the headers 2a, 2b by spot welding and the like is displaced from a normal attaching position. Further, in the case of this 1st embodiment, since the spacing between the one pair of headers 2a, 2b is prevented from increasing by the tongue-like parts 11, 11 formed in both end parts of each of the side plates 7, 7, not only a jig for supporting the heat exchanger for automobile when performing a brazing work can be simplified but also a strength of the heat exchanger for automobile after a completion is improved.

An action itself when condensation-liquefying a high temperature and high pressure refrigerant vapor to thereby make it into a liquid refrigerant by using as a condenser the heat exchanger for automobile of the present device, which is constituted in such a manner as mentioned above, is similar to the case of the condenser 1 which is one kind of the conventional heat exchanger for automobile mentioned before and, in a case where the high temperature and high pressure refrigerant vapor discharged from a compressor is condensation-liquefied, the refrigerant fed to one header 2a (or 2b) through the fluid inlet is fed toward the other header 2b (or 2a) through the plural heat-transfer pipes 3, 3. During flowing through each of the heat-transfer pipes 3, 3, the above refrigerant is condensation-liquefied by performing a heat exchange between it and the air passing through the core part 6 constituted by the heat-transfer pipes 3, 3 and the fins 4, 4, and fed from

the fluid outlet provided in the other header 2b toward an evaporator.

However, in the case of the heat exchanger for automobile of the present device, as mentioned before, since the fact that each of the headers 2a, 2b is displaced in the torsion rotation direction is surely prevented by inserting the taper parts 10, 10 formed in both end parts of each of the side plated 7, 7 into the through holes 9, 9 formed in both end parts of each of the headers 2a, 2b, the fact becomes null that each of the brackets 5, 5 fixed to each of the headers 2a, 2b is displaced from the normal position, so that the fact becomes null that a work for supporting the heat exchanger for automobile after the completion to a car body becomes troublesome.

Next, Fig.3 shows a 2nd embodiment of the present device.

In a case of this embodiment, the tongue-like part 10 like the 1st embodiment is not formed in the tip part of the taper part 10 formed in each of both end parts of the side plate 7 and, in compliance with this, in the end part of the header 2a (2b) there is formed only the through hole 9 and the small through hole 12 is not formed.

For this reason, in the case of this embodiment, when performing the brazing work, although it is necessary to restrain the one pair of headers 2a, 2b by a jig such that the spacing between them is not increased, the fact that each header 2a (2b) is displaced in the torsion rotation direction is surely

prevented similarly to the case of the 1st embodiment mentioned before.

(Advantage of the Device)

Since the heat exchanger for automobile of the present device is constituted and acts in such a manner as mentioned above, it is possible to surely regulate the attaching bracket, which has been fixed to each header, to the normal position, so that it becomes possible that the work for supporting the heat exchanger for automobile to the car body is easily performed.